11 Principal Threat Wastes

USEPA investigated the Mine Area for contamination from various metals, arsenic, and cyanide because they are used in the mining and processing of ore. The investigation showed that arsenic is the most prevalent contaminant at the Site and presents the most significant risk to human health and the primary risk to ecosystem health. As a result, arsenic was the primary contaminant considered in developing the alternatives for cleaning up the Site, although the same alternatives also address the other contaminants found at the Site. Both USEPA and the State of California consider arsenic a known human carcinogen. Potential non-cancer health effects from exposure to arsenic may include damage to tissues including nerves, stomach, intestines, and skin.

Sampling of several subareas of the Mine Area indicated that tailings-impacted areas contained higher levels of arsenic than surrounding areas. For comparison, arsenic levels in nearby natural soils were about 20 ppm and about 25 ppm in nearby sediments unaffected by the mine tailings. By far the highest levels of arsenic at the Site were detected in sediments at the adit (up to 34,000 ppm) and in and around the cyanide and mill buildings (up to 31,200 ppm in soil and 14,300 ppb in ponded water). Arsenic levels in the waste rock and tailings pile are highest at the surface, averaging 1,340 ppm, and decreasing with depth to 223 ppm in the deepest sample. The estimated volume of tailings and waste rock is 210,000 cy, of which about 50,000 cy is tailings. Soils around the two residences closest to the tailings pile also showed levels of arsenic (1,750 ppm and 1,230 ppm) much higher than normal for the area, and soil at a third residence showed somewhat elevated levels. Surface water from the collapsed adit and from seeps in the tailings pile and at the log dam all showed elevated arsenic concentrations, the highest level detected being 910 ppb detected at the adit during the low-flow period of late summer and early fall. Finally, one of four air samples collected in the tailings area contained arsenic exceeding the USEPA preliminary screening level.

Arsenic was present in the ore mined at the Site, and remained in the tailings after processing. The tailings were placed, uncovered, in the adjacent Little Clipper Creek drainage. Arsenic also occurs in water at the Site: oxidation in the underground rock or in the tailings, combined with surface and groundwater intrusion, results in the release of dissolved arsenic. Surface water flows, such as, notably, the January 1997 flood but also more normal surface water flows, including those coming from the adit, can transport both the dissolved arsenic and arsenic-contaminated tailings downstream away from the source area. Arsenic present in the uncovered tailings can also become airborne as dust during the dry conditions of summer. Thus, the arsenic-contaminated mine tailings present the principal contaminant source and the principle threat from the Site. USEPA considers these tailings to represent a principal threat waste. This source material is highly toxic and highly mobile and, as USEPA's HHRA for the Site shows, presents a significant risk should exposure occur.

12 Selected Remedy

After considering CERCLA's statutory requirements, the detailed comparison of the alternatives using the nine evaluation criteria, and public comments, USEPA, in consultation with the State of California has determined that the most appropriate remedy for this site includes:

Alternative 1-4 - Excavate contaminated soil around the three remaining Mine Area residences (the fourth will be demolished under Alternative 2-3); backfill the excavated areas with soil transported from an offsite borrow source and subjected to chemical analysis to ensure compliance with the cleanup goals cited in Section 8; and consolidate excavated material to the tailings disposal area for long-term management.

Alternative 2-3 - Consolidate, regrade, and cap the tailings with a low-permeability engineered cover system; contour, cover and revegetate the waste rock disposal area to promote runoff and reduce surface infiltration; replace the failed log dam with a rock buttress; divert clean surface water flows around the tailings and waste rock disposal areas; collect and treat contaminated water emanating from the mine (i.e. the mine drainage) and from the tailings pile (i.e. the seeps); discharge the treated water to Little Clipper Creek; remove tanks, vats, sumps, and contaminated soil from mine buildings, consolidating this material with the mine tailings or shipping it offsite for disposal; and implement land use restrictions to protect the Selected Remedy from physical disturbance and prohibit residential use of land parcels where such use is inconsistent with the Selected Remedy (such land use restrictions shall be implemented as land use covenants under California civil code, Section 1471 (c)).

Alternative 3-4 - Excavate the tailings and arsenic-contaminated sediment which has accumulated along Little Clipper Creek adjacent to Tensy Lane as far south as Greenhorn Road; regrade the excavated areas of the stream channel; and consolidate excavated material to the tailings disposal area for long-term management

12.1 Summary of Rationale for the Selected Remedy

USEPA finds that the alternatives listed in Section 9, for each portion of the remedy except the "no action" (Alternatives 1-1, 2-1, and 3-1) and "institutional controls only" alternatives (Alternatives 1-2 and 3-2), would generally satisfy the threshold requirements (i.e. provide adequate protectiveness and in most cases meet ARARs). Beyond the adequacy of the alternatives to meet threshold criteria, the other factors that differentiate the cleanup alternatives are described below.

For the Mine Area Residences, as discussed above, Alternatives 1-1 and 1-2 do not meet the threshold requirements and therefore are eliminated from further consideration. Between the two remaining alternatives (1-3 and 1-4), USEPA's analysis concludes that Alternative 1-4 (Excavation Around Residences) is superior to Alternative 1-3 (Capping Around Residences) because of the following reasons:

- Long-term Effectiveness and Permanence: By physically removing soil contaminated at levels above the soil cleanup goal from residential areas, Alternative 1-4 permanently eliminates the risk pathway, thereby achieving the greatest possible degree of long-term effectiveness. In contrast, under Alternative 1-3 waste is left in place and must be managed in the long term through inspection and maintenance of the soil cover, and through land use restrictions. Land

use restrictions are generally considered less reliable than physical measures because individuals unaware of use restrictions may still come in contact with Site related contaminants.

• Implementability: Although both Alternatives 1-3 and 1-4 rely on readily employed construction measures (fill and excavation, respectively), Alternative 1-4 requires no further measures beyond construction, and therefore its implementation concludes upon completion of construction. In contrast, Alternative 1-3 relies on land use restrictions in the form of a deed restriction preventing activities that would damage the soil cover and/or exposed the underlying Site related contaminants.

• Cost: As Alternatives 1-3 and 1-4 are very close in 50 year net present value cost ($250,000 and $350,000 respectively), the additional long-term effectiveness and implementability of Alternative 1-4 do not come at significant additional cost, therefore Alternative 1-4 is considered highly cost-effective.

For the Mine Buildings, Tailings, Waste Rock, and Mine Drainage alternatives, as discussed above, Alternative 2-1 does not meet the threshold requirements and is therefore are eliminated from further consideration. Alternatives 2-3 and 2-4 have in common the same elements except for the inclusion of cement stabilization of a portion of the tailings under Alternative 2-4; because Alternative 2-4 is more costly and does not result in any improvement in meeting Remedial Action Objectives, Alternative 2-4 is elminated from further consideration. The four remaining alternatives (2-2, 2-3, 2-5, and 2-6) share the same water treatment components in common, therefore there are no differneces to evaluate pertaining to water treatment. Between the four remaining alternatives, USEPA's analysis concludes that Alternative 2-3 (Capping, Buttress, Water Treatment) is superior to the other alternatives for the following reasons:

• Implementability: Alternative 2-6 (Offsite Disposal) is considered unimplementable due to: the large number of truckloads of material that would need to be hauled offsite; the associated hazards of handling, preparing, and shipping the fine-grained mine tailings; the residential nature of land use along likely haulage routes which could raise nuisance impacts to the surrounding community. In contrast Alternatives 2-2 (Surface Controls, Buttress, Water Treatment), 2-3 (Capping, Buttress, Water Treatment), and 2-5 (New Onsite Disposal Cell, Water Treatment) would all manage the waste onsite and utilize common construction practices. Each of these three alternatives would require some form of land use restriction. However, Alternative 2-5 would require more material handling than Alternatives 2-2 and 2-3, including extensive dewatering procedures, the necessity of large staging areas for dewatering and preparation for transport to the new disposal cell, and the haulage of the tailings to the new disposal cell requiring a similar number of truckloads as would be required under Alternative 2-6. This combination of factors under Alternative 2-5 increases the potential for airborne transport of the fine-grained mine tailings, potentially resulting in an exposure hazard to workers and nearby residential populations. For these reasons, USEPA considers Alternatives 2-2 and 2-3 superior to the other alternatives.

• Short-term Effectiveness: Again, due to the amount of material handling required by Alternatives 2-5 and 2-6, and the associated potential for short-term exposure of workers and nearby residential populations to airborne tailings, as discussed above, USEPA considers Alternatives 2-2 and 2-3 superior.

• Long-term Effectiveness and Permanence: Alternative 2-2 ranks much lower than Alternatives 2-3, 2-5, and 2-6, in permanence due to the fact that the soil cover system is the least robust, consisting of one foot of soil plus vegetation, which is more easily subject to environmental degradation in the form of erosion, root intrusion from plants, and excavation by burrowing animals. It also presents less of a barrier to human intrusion (Alternatives 2-3 and 2-5 include thicker soil covers and high density polyethlene membranes which in combination are more difficult to breach). Alternative 2-2 also ranks lower in groundwater protectiveness because it does not include a low permeability barrier as do Alternatives 2-3 and 2-5. Alternative 2-5 would be predicted to be superior to Alternative 2-3 at reducing leachate generated by the tailings during the first years of implementation, however USEPA believes in the long term Alternative 2-3 will meet a similar standard of groundwater protectiveness by minimizing the generation of leachate through the placement of surface water controls in combination with the capping of the tailings with an engineered low permeability cover system, and by collecting any leachate that may occur for treatment. Alternative 2-5 involves constructing a new landfill cell on currently uncontaminated property while attempting to restore the Little Clipper Creek stream channel; Alternative 2-3 caps the waste in place but does not impact currently uncontaminated property. Alternative 2-6 ranks highest in long term effectiveness and permanence because removing the mine tailings to an offsite disposal facility eliminates the need to manage this waste in place and results in fewer land use restrictions; however, as discussed above, USEPA considers Alternative 2-6 unimplementable. Therefore USEPA believes Alternatives 2-3 and 2-5 are the highest rated implementable alternatives under this criteria.

• Cost: In rank of cost from least to highest, the fifty year net present value of the four alternatives being considered is as follows: Alternative 2-2 ($10.7 million); Alternative 2-3 ($12.7 million); Alternative 2-5 ($14.1 million); and Alternative 2-6 ($16.7 million). Although Alternative 2-2 ranks lowest in terms of cost, due to concerns about its permanence, USEPA believes Alternative 2-3 provides the best balance of cost in combination with long term and short term effectiveness.

For the Little Clipper Creek alternatives, as discussed above, Alternatives 3-1 and 3-2 do not meet the threshold requirements and therefore are eliminated from further consideration. Between the two remaining alternatives (3-3 and 3-4), USEPA's analysis concludes that Alternative 3-4 (Excavation) is superior to Alternative 3-3 (Capping) because of the following reasons:

• Long-term Effectiveness and Permanence: By physically removing sediment contaminated at levels above the sediment cleanup goal from residential areas, Alternative 3-4 permanently eliminates the risk pathway, thereby achieving the greatest possible degree of long-term effectiveness. In contrast, under Alternative 3-3 waste is left in place and must be managed in the long term through inspection and maintenance of the sediment cap, and through land use restrictions.

• Implementability: Although both Alternatives 3-3 and 3-4 rely on readily employed construction measures (capping and excavation, respectively), Alternative 3-4 requires no further measures beyond construction, and therefore its implementation concludes upon completion of construction. In contrast, Alternative 3-3 relies on land use restrictions in the form of a deed restriction preventing activities that would damage the sediment cap and/or exposed the underlying Site related contaminants; such restrictions rely upon the knowledge and compliance of the property owner. Although hauling the excavated sediment back to the tailings disposal area is necessary under Alternative 3-4, the amount of material to be moved is manageable and is

estimated at 2000 cubic yards, a volume approximately 4% as large as that contained in the tailings disposal area itself. Alternative 3-4 would involve trucking the tailings back to the mine using the immediately adjacent mine access road. Alternative 3-3 would also involve truck traffic, in this case to import fill to areas of Little Clipper Creek to be capped; this material would have to be brought in using Greenhorn Road, which traverses residential areas.

• Cost: Alternative 3-4, which is superior in terms of the criteria discussed above, is also less costly than Alternative 3-3 (the fifty year net present values for the two alternatives are $500,000 and $1,000,000 respectively).

As described in Section 11, USEPA has designated the arsenic-contaminated tailings as a principal threat waste at the Site. This designation is based on the tailings containing elevated concentrations of highly toxic materials (arsenic) and being highly mobile when contacted by and eroded by surface water flows. The tailings represent a significant risk to human health or the environment should exposure occur (or continue to occur). The volume of tailings and expense of treating the tailings to remove the arsenic make physical treatment impracticable. The preference stated in the NCP is that USEPA address principal threats wherever practicable, preferably through treatment (NCP Section 300.430(a)(1)(iii)(A)). Although the tailings will not be treated, these principal threat wastes will be addressed through excavation (from around the Mine Area residences, in the Little Clipper Creek channel, and areas surrounding the tailings/waste rock pile) and containment (construction of the rock buttress, a low-permeability cap, and channelization of surface water). These activities will significantly reduce the potential future migration of and exposure to the tailings. In addition, the cap to be installed over the tailings along with the surface water control features, will greatly reduce potential transport of the arsenic away from the principal threat waste by reducing infiltration. Institutional controls plus access restrictions will also minimize potential exposure to the principal threat waste and prevent interference with the long term effectiveness of the remedy.

The selected remedy, Alternatives 1-4, 2-3, and 3-4, meets the two Superfund threshold evaluation criteria, overall protection of human health and the environment and compliance with ARARs, and provides the best balance of the remaining Superfund evaluation criteria.

12.2 Description of the Selected Remedy

The components of the selected remedy (see Figure 9/Selected Remedy Details) are as follows:

Mine Area Residences

- Demolish the residence located on parcel 39-160-25, referred to in this ROD as the Upper Rental, which was constructed on waste rock and/or tailings;
- Achieve cleanup goals by excavating arsenic-contaminated soil from the following three parcels on which individual residences are located, with the goal of returning the parcels to residential use: 39-160-16; 39-160-21; and 39-160-30;
- Consolidate excavated soil under the tailings pile engineered cover system for long-term management (see desciption of tailings management under Mine Buildings, Tailings, Waste Rock, and Mine Drainage, below); and

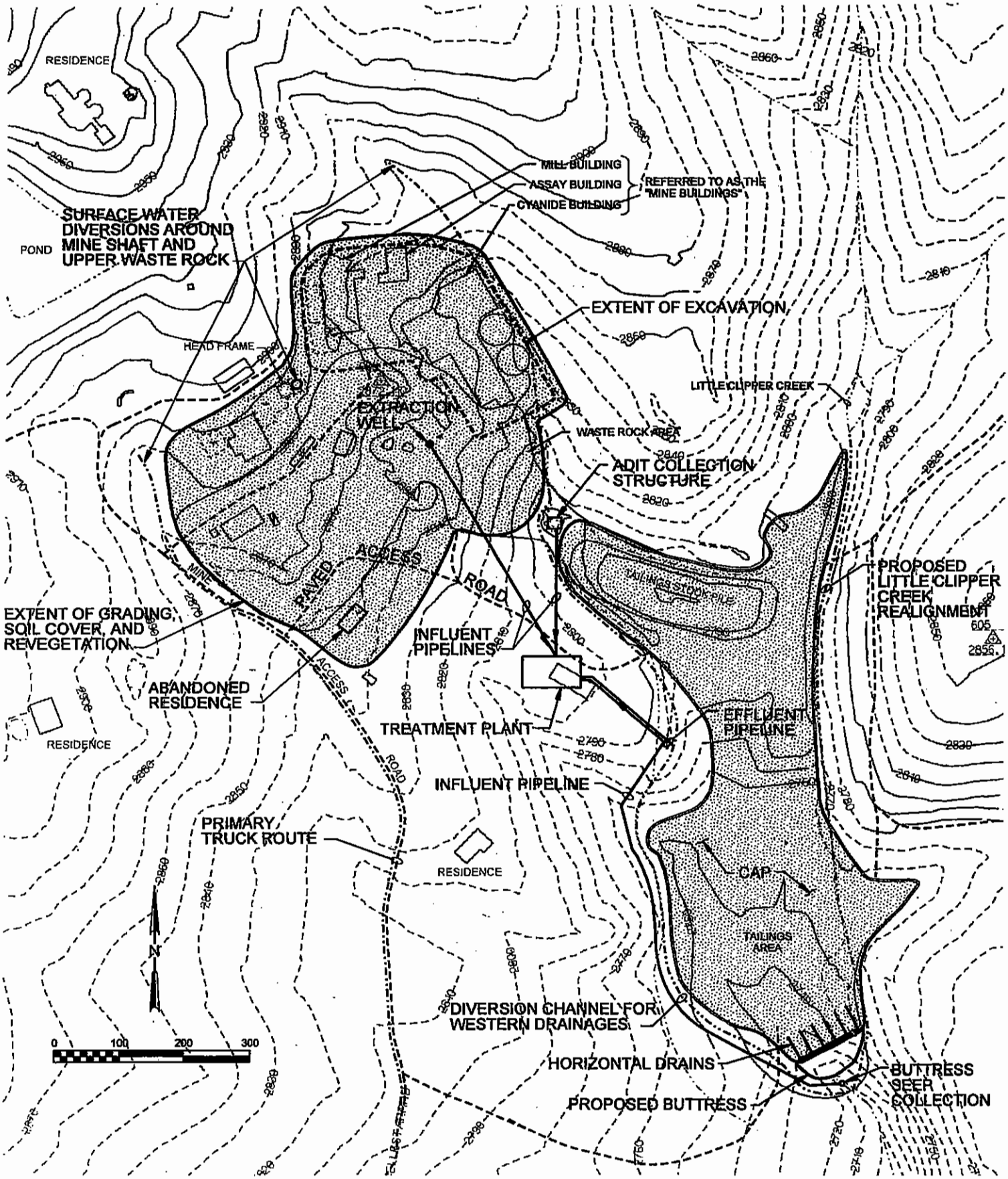


FIGURE 9
SELECTED REMEDY DETAILS
LAVA CAP MINE
NEVADA COUNTY, CALIFORNIA

- Backfill the excavated areas with soil transported from an offsite borrow source and subjected to chemical analysis to ensure compliance with the cleanup goals cited in Section 8; revegetate similar to pre-existing conditions.

Mine Buildings, Tailings, Waste Rock, and Mine Drainage

Institutional Controls

- Restrict unauthorized access by requiring deed restrictions limiting access and preventing residential, commercial, industrial, or recreational use of parcels 39-160-25 and 39-160-28;
- Require deed restrictions to prevent intrusive activities such as construction or excavation of any type that may disturb the Selected Remedy on parcels 39-160-25 and 39-160-28;
- Require deed restrictions to prevent alteration of or intereference with the operation of the Little Clipper Creek diversion structure partially located on parcel 39-160-27;
- Require deed restrictions to prevent alteration of the asphalt cap placed on exisiting gravel roadways on parcels 39-160-29; 39-160-25; and 39-160-30; and

Mine Buildings

- Restrict unauthorized access through the intallation of chain link fencing at portions of the Site including the mine buildings;
- Achieve cleanup goals through the excavation of contaminated soil in and around the cyanide, mill, and assay buildings;
- Reduce or eliminate hazards in the cyanide, mill, and assay buildings, including removal of soil and debris associated with former process tanks, removal of cyanide vats, and removal of sumps; and
- Subject material from the cyanide, mill, and assay buildings, to chemical analysis and consolidate material onsite or send offsite to an appropriate offsite disposal facility.

Tailings

- Restrict unauthorized access through the intallation of chain link fencing at portions of the Site including the tailings areas capped as part of the Selected Remedy;
- Regrade the tailings to flatten slopes;
- Achieve cleanup goals by excavating contaminated soil located around the periphery of the waste rock and tailings piles and consolidating this material under the tailings pile engineered cover system for long-term management;
- Cap the tailings with a low-permeability engineered cover system, to include a minimum six inch sand layer placed over the re-graded tailings, a 60-mil thick HDPE liner, a minimum two foot soil cover over the HDPE liner, plus shallow-rooted surface vegetation to maintain the cover system's resistance to erosion;
- Remove the remnants of the log dam and construct in its place a rock buttress capable of withstanding a horizontal ground acceleration of 0.3 g (where g is the force of gravity); to be

constructed approximately 20 feet in height with a downstream slope of 2.5 : 1 (horizontal to vertical dimension) and placed directly on bedrock; to include a 60-mil thick HDPE liner placed against the upstream (or tailings) side of the buttress and a sand drain placed on top of the HDPE liner to prevent seepage through the buttress to the downstream side;

- Install horizontal drains beneath the surface of the tailings and at the upstream (or tailings) side of the buttress to dewater the tailings and collect any leachate generated by the tailings for piping to the water treatment plant to be constructed as part of the Selected Remedy;

- Install a channel to divert Little Clipper Creek along the eastern boundary of the tailings pile; to be constructed to accommodate storm flows of a 100-year return frequency; to be constructed of rock gabions and a 60-mil thick HDPE liner; to be constructed 5 feet wide at the base and five feet in depth, with side slope dimensions of 2 : 1 (horizontal to vertical dimension);

- Construct diversion channels for the western drainage that occurs adjacent to the mine buildings and for the seasonal surface water flow that occurs along the western boundary of tailings pile; to be constructed to accomodate storm flows of a 100-year return frequency; to be constructed of rock gabions and a 60-mil thick HDPE liner; require deed restrictions on parcels 39-160-25 to prevent alteration of the diversion channel; and

- Conduct periodic monitoring of surface water and groundwater downgradient of the tailings pile to assess compliance with cleanup goals.

Waste Rock

- Restrict unauthorized access through the intallation of chain link fencing at portions of the Site including waste rock areas capped as part of the Selected Remedy;

- Construct shallow rip-rap lined surface water diversion structures above the mine shaft and waste rock areas to reduce infiltration into the system of shafts and tunnels and thereby potentially reduce the volume of adit seepage;

- Regrade the waste rock to facilitate runoff and reduce surface-water infiltration;

- Cover the regraded waste rock with one foot of soil and vegetation; and

- Pave the primary access roads (which appear to have waste rock based components) on the mine property, including a road to the surface water treatment plant, to reduce dust emissions.

Mine Drainage

- Restrict unauthorized access through the intallation of chain link fencing at portions of the Site including water treatment collection, piping, and treatment facilities installed as part of the Selected Remedy;

- Pump water out of the mine workings to reduce or eliminate discharge from the adit; pipe extracted mine water to the water treatment plant to be constructed as part of the Selected Remedy;

- Construct an adit structure to measure seepage flow rates and to collect any remaining adit seepage not captured by pumping from the mine workings; subject material excavated from the adit as part of

construction to chemical analysis and consolidate onsite or ship offsite to an appropriate disposal facility;

- Construct a water treatment plant to treat surface water collected from the mine workings and/or adit and from the mine tailings; treatment to consist of a ferric chloride coagulation/filtration process or alternative innovative technology if demonstrated feasible and cost effective in comparison to the ferric chloride coagulation/filtration process; and
- Conduct periodic monitoring of surface water in Little Clipper Creek upstream and downstream of the mine area to assess compliance with cleanup goals.

Little Clipper Creek

- Achieve cleanup goals by excavating arsenic-contaminated soil/sediment from Little Clipper Creek channel and adjacent deposition areas;
- Subject excavated tailings to chemical analysis and consolidate material onsite or ship offsite to an appropriate disposal facility;
- Grade the excavated area to re-establish the Little Clipper Creek channel, stabilize the channel bed and banks, and revegetate similar to pre-existing conditions;
- Construct temporary roads to provide access to extent of areas requiring excavation, to be removed following completion of construction activity; and
- Continue to conduct surface-water monitoring in Little Clipper Creek within and downstream of the boundaries of the Mine Area Operable Unit to assess compliance with cleanup goals.

The actual technologies to be used in implementing the remedy will be determined during remedial design. Minor modifications to the remedy may also occur during remedial design or construction. However, public notice would be given by USEPA if there were any significant changes to the remedy, and any fundamental changes would be subject to public comment.

Additional technical details on each component of the selected remedy, including cleanup or design criteria and compliance are provided in the following sections.

12.2.1 Mine Area Residences Cleanup Criteria

- All soil contaminated with arsenic in excess of cleanup goals (see Table 9 for cleanup goals) on the three residential parcels 39-160-16, 39-160-21, and 39-160-30, will be excavated and consolidated with the tailings for long-term management.
- Determination of the areal extent to be excavated will be based on chemical analysis of representative soils collected from multiple locations on each parcel. Visual assessment may be used to identify sampling locations in areas suspected to be contaminated due to the presence of materials resembling the mine tailings; however, sample locations for each of the parcels will be distributed to include areas of the parcels with no immediately discernable visual evidence of tailings.
- Determination of depths of soil to be excavated will be based on further sampling at areal locations determined to have arsenic prsent above cleanup goals. Excavation will be terminated when soil is encountered that meets cleanup goals or at bedrock if encountered.

Compliance with Mine Area Residences Cleanup Criteria

Compliance will be determined using the results of post-excavation, confirmation soil sampling. To confirm that cleanup to background levels (background concentrations are identified as the cleanup goal in Table 9) has been achieved, the post-excavation soil sampling data set will be compared to the surface soil background data set using statistical techniques. USEPA has developed a guidance document that will be used to assist in conducting this statistical comparison: *Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites/USEPA 540-R-01-003/September 2002* (USEPA, 2002a).

12.2.2 Mine Buildings, Tailings, Waste Rock and Mine Drainage Design and Cleanup Criteria

This section provides the design criteria and cleanup criteria to be used in designing, constructing, and evaluating performance of the selected remedy. Where appropriate, compliance criteria have been identified also. For some of the components, there are no specific compliance criteria because compliance will be demonstrated by ensuring that the remedial design meets the specified design criteria.

Institutional Controls Requirements

- Provide detailed notification to any tenants or workers on the property regarding the presence of hazardous substances
- Provide detailed notification to any tenants or workers on the property regarding deed restrictions, specifically prohibited activities intended to ensure uninterrupted performance of the Selected Remedy as well as overall protection of human health and the environment.
- Prevent access to the mine buildings.
- Prevent activities that might damage or affect the integrity of the tailings cap, covered waste rock, surface water controls, or the rock buttress.
- Prevent any activities that might interfere with the effectiveness of the Selected Remedy.
- Prevent development or use of the Mine Area for any commercial, industrial, recreational or residential use that would expose any person to contaminated soil or surface water.

Implementation and Compliance with Institutional Control Requirements

Implementation of land use restrictions governed by the above requirements is planned as follows:

- Require deed restrictions to prevent: residential use, a hospital, a public or private school or a day care center, on parcels 39-160-25 and 39-160-28.
- Require deed restrictions to prevent intrusive activities such as construction or excavation of any type that would interfere with the Selected Remedy on parcels 39-160-25 and 39-160-28.
- Require deed restrictions to prevent alteration of or intereference with the operation of the Little Clipper Creek diversion structure partially located on parcel 39-160-27.

- Require deed restrictions to prevent alteration of the asphalt cap placed on exisiting gravel roadways on parcels 39-160-29; 39-160-25; and 39-160-30.

- When developing the long term operations and maintenance plan for the site, include a compliance monitoring system to include periodic site inspections and administrative review of deed restrictions.

Additional language within the deed restrictions is planned to include the following:

- The owner of the aforementioned parcels must give notice of all institutional controls to any lessees of any portion of the Site.

- All land use controls must be recorded and run with the land pursuant to California Civil Code Section 1471(c), CA Health and Safety Code Section 25355.5, or other enforceable legal mechanism, to ensure that the restrictionsare binding on all current and future property owners, their heirs, successors, and assignees, and the agents, employees or lessees of the owners, heirs, successors and assignees.

- The owner must give 6 months prior notice to USEPA before any sale of any portion of the Site.

- The owner must identify to USEPA all lessees on any portion of the Site within 30 days of such lessees occupying any portion of the Site.

Mine Building Design and Cleanup Criteria

- Based on data from the RI, all soil/wastes inside of the mill, assay, and cyanide buildings are considered to be highly-contaminated with elevated levels of arsenic and will be excavated for characterization, following which the material will either be consolidated with the tailings for long-term management or, more likely, disposed of at an appropriate offsite facility.

- Most of the area in the immediate vicinity of the mine buildings is waste rock and will be addressed along with the rest of the stockpiled waste rock (see below). However, the surface soil in the immediate vicinity of the mill, assay, and cyanide buildings appears to have been impacted by processing activities and will be excavated to meet cleanup goals. Determination of the areal extent to be excavated will be based on chemical analysis of representative soils collected from multiple locations. The excavated material will be subjected to chemical analysis for the proper characterization and disposal of the material.

- Any water present in the sumps in the mill and cyanide buildings will be removed, characterized, and either treated to achieve cleanup goals or disposed of in an appropriate offsite facility.

- Physical features that remain from former processing activities, including tanks, vats, and sumps will be inspected to determine if they can be readily removed and disposed. Larger items will be left and decontaminated to reduce Site-related contamination to levels below the cleanup goals established in Section 8 above.

- Following excavation of soil/wastes and conducting any required hazard abatement, the remaining concrete foundations and metal siding will be decontaminated to reduce Site-related contamination to levels below the cleanup goals established in Section 8 above.

- Because some of the soil/wastes from the mine buildings contain significantly elevated contaminant concentrations, these materials will be isolated from the remaining tailings and undergo separate

characterization to determine the appropriate disposition of this material: either consolidation onsite of shipment offsite to an appropriate disposal facility.

Compliance with Mine Building Design and Cleanup Criteria

- Soil samples will be collected beyond the area of excavation around the mine buildings to ensure that all of the highly-contaminated materials have been removed. The remaining area will be covered along with the rest of the waste rock. If higher concentrations remain, additional excavation of highly-contaminated materials will be conducted.

- Any of the excavated soil/wastes from within and adjacent to the mine buildings will undergo separate characterization to determine the appropriate disposition of this material: either consolidation onsite of shipment offsiet to an appropriate disposal facility.

Tailings Pile Cap Design and Cleanup Criteria

- All areas to be capped shall be graded to slopes of 4:1 or flatter prior to placement of the cap. The cap shall extend across the entire tailings pile area and the adjacent waste rock area (see Figure 9).

- All soil contaminated with arsenic in excess of cleanup goals (see Table 9) in the vicinity of the tailings pile and waste rock areas shall be excavated and consolidated under the tailings pile cap. Determination of the areal extent to be excavated will be based on chemical analysis of representative soils collected from multiple locations. Visual assessment may be used to identify sampling locations in areas suspected to be contaminated due to the presence of materials resembling the mine tailings; however, sample locations will be distributed to include areas with no immediately discernable visual evidence of tailings.

- The tailings cap shall, at a minimum, consist of a 6-inch thick sand layer placed over the tailings, a 60-mil HDPE liner (or equivalent) placed over the sand layer, and 18 inches of low-permeability cover soil plus vegetative cover placed over the HDPE liner.

- The grading and stormwater controls shall be sufficient to ensure that standing water does not accumulate on the vegetated soil cover.

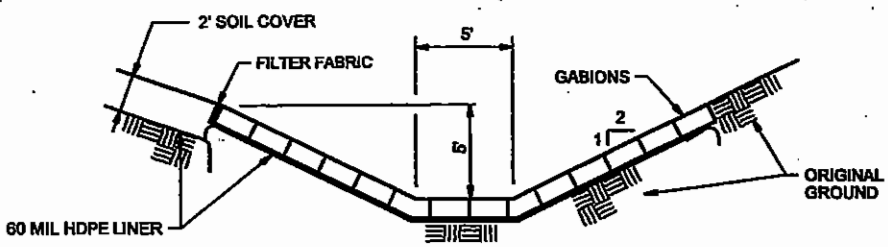
- The vegetation selected for the tailings cap shall be similar to existing vegetation in the area and require minimal irrigation.

Compliance with Tailings Cap Design and Cleanup Criteria

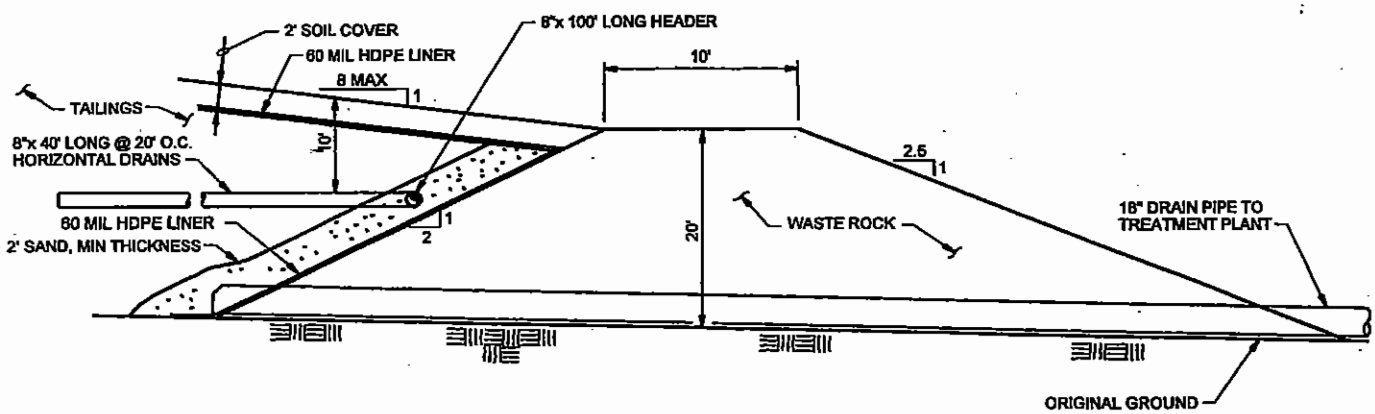
- Compliance will initially be demonstrated during construction by ensuring that the cap meets the minimum thickness criteria presented above.

- As part of long-term O&M, visual monitoring will be conducted routinely to verify the continued integrity of the cap, including confirming that standing water is not present on the cap and monitoring for excessive erosion of the cap.

- For the cleanup of contaminated soil surrounding the tailings/waste rock areas, compliance will be determined using the results of post-excavation, confirmation soil sampling. The same process as described above for the Mine Areas residences excavation will be used to confirm that cleanup to background levels has been achieved.



LITTLE CLIPPER CREEK DIVERSION CHANNEL TYPICAL CROSS SECTION



TYPICAL BUTTRESS CROSS SECTION

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FIGURE 10
CONCEPTUAL DESIGN FEATURES
LAVA CAP MINE
NEVADA COUNTY, CALIFORNIA

Rock Buttress Design Criteria

- From a seismic perspective, the rock buttress shall be designed to achieve internal and external stability under static and pseudo-static conditions. Stability criteria shall include a factor of safety greater than 1.5 under static conditions and 1.1 under pseudo-static conditions.
- The buttress will be placed directly on bedrock following removal of the log dam remnants and the tailings located within and downstream of the buttress footprint. If possible, the buttress will be constructed of onsite waste rock.
- To prevent seepage through the buttress, a liner will be installed on the upstream face of the buttress. A sand blanket drain with an outlet pipe at the base of the buttress will be used to collect seepage. To maintain a dewatered condition directly upstream of the buttress, horizontal drains will be placed in the tailings and connected to the blanket drain for collection and piping to the onsite water treatment plant to be constructed as part of the Selected Remedy. (See Figure 10/Conceptual Design Features.)
- The upstream tailings will be graded and sloped to ensure stability of the pile. The appropriate slope and distance shall be determined during remedial design.

Little Clipper Creek Channel and Western Drainages Channel Design Criteria

- The engineered Little Clipper Creek channel to be installed along the eastern edge of the tailings and waste rock shall extend from upstream of any waste rock/tailings to beyond the rock buttress and be sized to handle the estimated return flow from a 100-year storm event (see Figure 10).
- Similarly, the channel for the western drainages shall be designed to handle the 100-year event and shall direct flow around the upper areas of stockpiled waste rock, past the entire tailings pile, and extending to below the rock buttress (see Figure 9).
- The upstream end of both channels will be excavated and keyed into bedrock to allow capture of subsurface flow through the upper alluvial layer (estimated to be between 2 and 10 feet below ground surface [bgs]) and minimize the possibility of continued flow of surface water into the waste rock.

Waste Rock Design Criteria

- All stockpiled waste rock (see Figure 9) shall be graded to facilitate runoff and reduce surface water infiltration. The waste rock area extends from above the adit north to the area surrounding the mine shaft and mine buildings.
- Following grading, the waste rock shall be covered with at least one foot of soil and vegetated to further reduce infiltration and minimize potential disturbance by human activities.
- Lined surface water diversions shall be installed above the mine shaft and upper end of the waste rock stockpile to reduce flow of surface water into the waste rock and shaft.

Mine Drainage Design and Cleanup Criteria

- If feasible, the preference is to pump water out of the mine workings to maintain the water level in the mine below the mine adit elevation. Pumping from the mine workings is considered a more effective method of reducing mine discharge than simply capturing the surface water as it leaves the

adit, plus pumping down the mine workings allows the workings to be used to balance flow to allow for planned (i.e. for maintenance) and unplanned treatment plant outages. Any water pumped from the mine will need to be piped to the treatment plant for treatment. Based on historic information, it is anticipated that, once the upper workings are dewatered, it will require an extraction rate of around 50 gpm to maintain the water level below the adit.

- Even if it proves feasible to pump from the mine workings, a collection structure will be constructed at the adit to collect any incidental seepage. This collection structure will be keyed into bedrock to minimize flow into the waste rock/tailings pile. Because the arsenic concentrations in sediment in the location of the caved-in adit are very high (up to 34,000 ppm), any sediment excavated from this area will be isolated for chemical characterization to determine appropriate handling (i.e. consolidation with the tailings onsite, or shipment to an appropriate offsite disposal facility).

- Seepage collected by the drain system installed on the rock buttress will also need to be pumped to the treatment plant. The seepage flow rates at the buttress are expected to drop considerably after the first few years of operation as the tailings are cutoff from further surface water infiltration.

Compliance with Mine Drainage Design and Cleanup Criteria

- If pumping from the mine workings is implemented, water level readings will be collected regularly to confirm that the water level in the mine is maintained below the adit elevation.

- If the excavated sediment from the location of the caved-in adit fails characterization testing, it will be disposed offsite at an appropriate disposal facility and will not be consolidated with the tailings.

Water Treatment System Design and Cleanup Criteria

The remedy includes a treatment system for treating mine drainage (pumped from the workings and/or collected at the adit) and tailings seepage (collected from beneath the capped area by means of collection pipes with a collection structure at a low point near the rock buttress). However, design and construction of the full-scale treatment system will be conducted as a second phase of remedy implementation. As noted previously, this will allow USEPA to evaluate the changes in drainage/seepage flow rates expected from implementation of the tailings pile cap, waste rock cover, and surface water management features (Little Clipper Creek channel, western drainage channel, surface water diversions above the waste rock, and improved adit seepage collection).

Because the flow rates requiring treatment and the arsenic concentrations in the treatment plant influent are unknown, USEPA believes that selection of the treatment technology should be delayed until a subsequent phase of remedial design. The ferric chloride coagulation/filtration treatment process that has been assumed for estimating remedy costs is considered the most reliable, cost-effective approach of the currently available conventional treatment technologies. However, extensive arsenic treatment research is ongoing for both conventional and innovative technologies. During initial remedy implementation, USEPA anticipates conducting additional pilot-level testing of innovative technologies, including adsorptive media treatment technologies, that may have lower capital and operator oversight requirements than the ferric chloride system.

In the FS, USEPA evaluated various potential surface water discharge limits based on current ARARs. These limits are presented in Table 14 below for constituents detected in mine adit discharge or seeps, along with the basis for their selection.

Media	Discharge Limit (ug/L)	Basis for Discharge Limit
Aluminum	200	Secondary MCL
Antimony	6	Primary MCL
Arsenic	10	Primary MCL
Cadmium	2.2	CTR criteria
Copper	9.0	CTR criteria
Cyanide	5.2	CTR criteria
Iron	300	Basin Plan
Lead	2.5	CTR Criteria
Manganese	50	Basin Plan
Mercury	0.05	CTR Criteria
pH	+/- 0.5 of Ambient Level	Background/Basin Plan
Sulfate	250,000	Secondary MCL
Total Dissolved Solids (TDS)	500,000	Secondary MCL

Table 14: Surface Water Treatment Discharge Limits

Water Treatment System Compliance with Design and Cleanup Criteria

- Treatment system effluent will require routine monitoring to ensure that the surface water discharge limits are being met. Water quality results will be compared to the values listed in Table 14 to determine compliance.
- If the ferric chloride coagulation/filtration treatment process is selected, sludge will be generated at the treatment plant. Following dewatering, this sludge will need to characterized (i.e., STLC and TCLP analyses) to determine disposal requirements. It has been assumed, based on available information including site specific data and operational data from exisiting systems within the United States, that the sludge will be able to be disposed as an industrial non-hazardous waste in an offsite Class II disposal facility. However, the final disposition of sludge will be based on the test results.

Monitoring Requirements

Routine monitoring will be required to ensure that the remedy is operating as intended and not resulting in downstream surface water impacts or contributing to groundwater contamination. This will include surface water monitoring in Little Clipper Creek upstream and downstream of the Mine Area during high- and low-flow conditions and following storm events.

Groundwater monitoring wells will be installed downgradient of the tailings pile to provide for long-term monitoring of potential groundwater impacts from the tailings. Ultimately, it is expected that groundwater monitoring related to the Mine Area OU will be coordinated with any groundwater remedial actions (including monitoring) that may be implemented based on the results of the ongoing Groundwater

OU RI/FS. Because arsenic concentrations are already elevated in groundwater beneath the tailings pile, it may be difficult to differentiate between pre-existing conditions and any future groundwater impacts from the tailings pile after remedy implementation. However, USEPA expects to continue to work closely with the State of California during remedy implementation to monitor and evaluate groundwater monitoring data and ensure that the tailings pile is not acting as a long-term source of groundwater contamination.

Another component of the monitoring program will be measuring seepage rates from the adit and buttress to assess performance of the remedy at reducing infiltration into the waste rock and tailings pile. USEPA expects the seepage rates to decline considerably after the first few years of remedy implementation. If the seepage rates do not drop over time, it may indicate that the capping and surface water management components of the remedy are not performing as intended.

12.2.3 Little Clipper Creek Cleanup Criteria

- Deposition areas containing sediment/soil contaminated with arsenic in excess of cleanup goals (see Table 9 for cleanup goals) in or adjacent to the Little Clipper Creek channel between the log dam and Greenhorn Road will be excavated (see following bullets for anticipated extent of excavation; also see Figure 5/Little Clipper Creek Source Areas).

- Determination of the areal extent to be excavated will be based on chemical analysis of representative soil/sediment collected from multiple locations along the designated reaches of Little Clipper Creek. Visual assessment may be used to identify sampling locations in areas suspected to be contaminated due to the presence of materials resembling the mine tailings; however, sample locations for each of the reaches of the creek will be distributed to include areas of the parcels with no immediately discernable visual evidence of tailings.

- Determination of depths of soil/sediment to be excavated will be based on further sampling at areal locations determined to have arsenic prsent above cleanup goals. Excavation will be terminated when soil is encountered that meets cleanup goals or at bedrock if encountered.

Compliance with Little Clipper Creek Cleanup Criteria

Compliance will be determined using the results of post-excavation, confirmation sediment/soil sampling. To confirm that cleanup to background levels (background concentrations are identified as the cleanup goal in Table 9) has been achieved, the post-excavation sediment/soil sampling data sets will be compared to the sediment and surface soil background data sets using statistical techniques. USEPA has developed a guidance document that will be used to assist in conducting this statistical comparison: *Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites/USEPA 540-R-01-003/September 2002* (USEPA, 2002a).

12.3 Summary of the Estimated Remedy Costs

A detailed breakdown of the estimated capital, O&M, and present worth costs associated with the selected remedy is included in Table 15. The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the selected remedy. Major changes if they were to occur would be documented in the form of

Table 15
Detailed Cost Estimate for the Selected Remedy
Lava Cap Mine Site - Mine Area OU ROD

Component	Quantity	Unit	Unit Cost ($)		Cost ($)
Capital Costs (including Engineering and Management)					**Capital Costs**
Mine Area Residences					
Excavation	1	ls.	$62,000		$62,000
Backfill and Revegetation	1	ls.	$69,500		$69,500
Consolidation w/Tailings Pile	1	ls.	$21,000		$21,000
Contractor Overhead, Mobilization, and Profit			24%		$37,100
Contingency			25%		$47,400
Mine Area Residences Capital Cost Subtotal					$237,000
Engineering and Remedial Design Investigation			21%		$49,700
Construction Management, Licenses/Legal			8%		$23,300
Total Mine Area Residances Capital Costs					***$310,000***
Mine Buildings, Tailings, Waste Rock and Mine Discharge (Mine Source Areas)					
Mine Buildings	1	ls.	$360,000		$360,000
Tailings and Waste Rock	1	ls.	$925,000		$925,000
Buttress Construction	1	ls.	$436,000		$436,000
LCC and Western Drainages	1	ls.	$403,000		$403,000
Adit Collection and Pumping from Mine Workings	1	ls.	$72,000		$72,000
Road Maintenance and Repairs	1	ls.	$68,000		$68,000
				Low-Flow	High-Flow
Treatment Plant - Low Flow	1	ls.	$525,000	$525,000	
Treatment Plant - High Flow	1	ls.	$1,640,000		$1,640,000
Contractor Overhead, Mobilization, and Profit			24%	$678,000	$949,000
Contingency			25%	$867,000	$1,213,000
Mine Source Areas Capital Cost Subtotal				$4,334,000	$6,066,000
Engineering and Remedial Design Investigation			21%	$908,000	$1,271,000
Construction Management, Licenses/Legal			8%	$426,000	$596,000
Total Mine Source Areas Capital Costs				***$5,670,000***	***$7,930,000***
Little Clipper Creek					
Excavation	1	ls.	$58,600		$58,600
Backfill, Stream Channel and Revegetation	1	ls.	$24,400		$24,400
Consolidation w/Tailings Pile	1	ls.	$18,700		$18,700
Road Maintenance and Repaving	1	ls.	$47,300		$47,300
Contractor Overhead, Mobilization, and Profit			24%		$36,200
Contingency			25%		$46,300
Little Clipper Creek Capital Cost Subtotal					$231,500
Engineering and Remedial Design Investigation			21%		$48,500
Construction Management, Licenses/Legal			8%		$22,700
Total Little Clipper Creek Capital Costs					***$300,000***
TOTAL ESTIMATED CAPITAL COST RANGE :				***$6,280,000***	***$8,540,000***

Equipment Replacement Costs	Quantity	Units	Replacement Cost	Present Worth Cost [1]	
				Low-Flow	High-Flow
Treatment Plant - Low Flow (Replace after 25 years)	1	ls.	$1,070,000	$485,000	
Treatment Plant - Hihg Flow (Replace after 25 years)	1	ls.	$3,330,000		$1,520,000
TOTAL DISCOUNTED REPLACEMENT COST RANGE:				***$485,000***	***$1,520,000***

Table 15
Detailed Cost Estimate for the Selected Remedy
Lava Cap Mine Site - Mine Area OU ROD

Annual Operations & Maintenance Costs	Quantity	Units	Annual Cost ($)	Present Worth Cost [2] ($)	
Mine Area Residences					
No O&M Required					$0
Mine Buildings, Tailings, Waste Rock and Mine Discharge					
Land Use Restrictions (Implement, Inspect)	1	yr.	$2,300		$57,000
Tailings Cap Repair, Tailings/Waste Rock Regrading	1	yr.	$10,900		$270,000
LCC and Western Drainages	1	yr.	$5,043		$125,000
Adit Collection, Mine Pumping, and Buttress Collection	1	yr.	$3,100		$77,000
Surface Water Monitoring	1	yr.	$8,700		$216,000
				Low-Flow	High-Flow
Treatment Plant - Low Flow	1	yr.	$70,400	$1,740,000	
Treatment Plant - High Flow	1	yr.	$125,000		$3,100,000
Total Mine Source Areas O&M Costs				***$2,485,000***	***$3,850,000***
Little Clipper Creek O&M					
Surface Water Monitoring	1	yr.	$8,120		$201,000
Total Little Clipper Creek O&M Costs					***$201,000***
TOTAL DISCOUNTED O&M COST RANGE :				***$2,690,000***	***$4,050,000***
TOTAL ESTIMATED CAPITAL COST:				**$6,280,000**	**$8,540,000**
TOTAL DISCOUNTED REPLACEMENT COST:				**$485,000**	**$1,520,000**
ESTIMATED PRESENT WORTH COST:				**$9,500,000**	**$14,100,000**

Notes

(1) Based on a 3.2% discount rate and the expenditures occurring in 25 years.

(2) Based on a 3.2% discount rate and 50 years of O&M.

Capital cost estimates are not discounted because the construction work will be performed in the early stages of the project. O&M costs are reported as present worth estimates given a 3.2% discount rate for a duration of 50 years.

Cost estimates are based on waste rock/tailings volumes, treatment rates, and treatment plant influent quality estimates that may be refined during remedial design. Cost estimates are expected to be within a +50 to -30% accuracy range.

ls. = lump sum; yr. = year

a memorandum in the Administrative Record file, an Explanation of Significant Differences (ESD) or a ROD Amendment.

The capital cost to construct the selected remedy is estimated at $8.54 million. This cost projection assumes the worst-case water treatment scenario under which high-end flow estimates are used. USEPA is fairly certain that the water treatment component of the remedy cost, which is significant, can be reduced by re-directing clean surface water flows that currently enter the mine waste and thereby become contaminated. Although typically a thirty-year present value cost is calculated for federal Superfund projects, at the request of the State of California, USEPA calculated fifty-year present values for the Mine Area OU remedy. The 50-year present worth is estimated at $14.1 million, again assuming high-flow treatment requirements. As is the practice at federal Superfund sites, these cost estimates are based on an expected accuracy range of -30 to +50 percent. The discount rate used for the fifty-year present value cost projection was 3.2 per cent based on Appendix C of Office of Management and Budget Circular A-94.

12.4 Expected Outcomes of the Selected Remedy

The expected outcomes of the selected remedy are as follows. After implementation of the Mine Area Residences component of the Selected Remedy, which will result in the reduction of soil contamination levels to meet cleanup goals, the parcels which the three remaining Mine Area residences occupy (the fourth will be demolished as part of the Selected Remedy) will be available for residential use. Groundwater use restrictions may be necessary in future for these parcels, however, USEPA is deferring a determination on groundwater use restrictions until completion of the Groundwater Operable Unit Remedial Investigation/Feasibility Study.

After implementation of the Little Clipper Creek component of the Selected Remedy, which will result in: 1) the reduction of sediment contamination levels to meet cleanup goals; and 2) the reduction of surface water contamination levels to meet cleanup goals, the two parcels on which these conditions currently exist will be available for unrestricted surface use. Groundwater use restrictions may be necessary in the future for these parcels, however, USEPA is deferring a determination on groundwater use restrictions until completion of the Groundwater Operable Unit Remedial Investigation/Feasibility Study.

After implementation of the Mine Buildings, Waste Rock, Tailings, and Mine Drainage component of the Selected Remedy, long-term use will be restricted on multiple parcels as discussed above, because waste will remain in place on some parcels, and operational parts of the Selected Remedy will remain in place on other parcels. Neverthless, implementation of the Selected Remedy will result in a greatly reduced potential for further release of contaminated tailings, significantly reducing the threat the mine poses to downstream receptors. Little Clipper Creek will be restored to its beneficial use as a potential drinking water supply. Risks to human and ecological receptors at the Mine Area Operable Unit will be managed through the consolidation, capping and covering of source materials (waste rock and tailings) and the treatment of mine drainage and seeps. Because wastes are left onsite permanently, continuous monitoring and maintenance of the wastes (including the formal Five Year Review process required under CERCLA) will be required for the foreseeable future to ensure long-term protectiveness.

13 Applicable or Relevant and Appropriate Requirements (ARARs)

Section 121(d) of CERCLA, 42 U.S.C. § 9621(d) requires that remedial actions at CERCLA sites attain (or justify the waiver of) any federal or state environmental standards, requirements, criteria, or limitations that are determined to be legally applicable or relevant and appropriate. These applicable or relevant and appropriate requirements are referred to as "ARARs." Federal ARARs may include requirements promulgated under any federal environmental laws. State ARARs may only include promulgated, enforceable environmental or facility-siting laws of general application that are more stringent or broader in scope than federal requirements and that are identified by the state in a timely manner.

An ARAR may be either "applicable," or "relevant and appropriate," but not both. If there is no specific federal or state ARAR for a particular chemical or remedial action, or if the existing ARARs are not considered sufficiently protective, then other guidance or criteria to be considered (TBCs) may be identified and used to ensure the protection of public health and the environment. The NCP, 40 C.F.R. Part 300, defines "applicable," "relevant and appropriate," and "to be considered" as follows:

- **Applicable requirements** are those cleanup standards, standards of control, or other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstances found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable.

- **Relevant and appropriate requirements** are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and that are more stringent than federal requirements may be relevant and appropriate.

- **TBCs** consist of advisories, criteria, or guidance that USEPA, other federal agencies, or states developed that may be useful in developing CERCLA remedies. The TBC values and guidelines may be used as USEPA deems appropriate. Once a TBC is adopted, it becomes an enforceable requirement.

ARARs are identified on a site-specific basis from information about the chemicals at the site, the remedial actions contemplated, the physical characteristics of the site, and other appropriate factors. ARARs include only substantive, not administrative, requirements, and pertain only to onsite activities. Section 121(e) of CERCLA, U.S.C. 9621(e), states that no federal, state or local permit is required for remedial actions conducted entirely onsite. Offsite activities, however, must comply with all applicable federal, state, and local laws, including both substantive and administrative requirements, that are in effect when the activity takes place. There are three general categories of ARARs:

- **Chemical-specific** ARARs are health- or risk-based concentration limits, numerical values, or methodologies for various environmental media (i.e., groundwater, surface water, air, and soil) that

are established for a specific chemical that may be present in a specific media at the site, or that may be discharged to the site during remedial activities. These ARARs set limits on concentrations of specific hazardous substances, pollutants, and contaminants in the environment. Examples of this type of ARAR include state and federal drinking water standards.

- **Location-specific** ARARs set restrictions on certain types of activities based on site characteristics. Federal and state location-specific ARARs are restrictions placed on the concentration of a contaminant or the activities to be conducted because they are in a specific location. Examples of special locations possibly requiring ARARs may include flood plains, wetlands, historic places, and sensitive ecosystems or habitats.

- **Action-specific** ARARs are technology- or activity-based requirements that are triggered by the specific type of remedial activities selected. Examples of this type of ARAR are RCRA regulations for waste treatment, storage, or disposal.

USEPA has evaluated and identified the ARARs for the selected remedy in accordance with CERCLA, the NCP, and USEPA guidance, including the CERCLA Compliance with Other Laws Manual, Part I (Interim Final), OSWER Directive 9234.1-01 (USEPA, 1988a) and CERCLA Compliance with Other Laws Manual, Part II, OSWER Directive 9234.1-02 (USEPA, 1989). Tables 16 (chemical-specific), 17 (location-specific), and 18 (action-specific) present the ARARs for the selected remedy.

13.1 Chemical-Specific ARARs

Table 17 summarizes the chemical-specific ARARs for the selected remedy. The following sections present a discussion of chemical-specific ARARs and identify why these chemical values are applicable and/or relevant and appropriate. There are no chemical-specific ARARs that provide numerical cleanup criteria for COCs in soils and sediments at the Lava Cap Mine Site.

Mine-related contaminants that are discharged to Little Clipper Creek must comply with applicable federal and state water quality criteria. USEPA guidance states that federal water quality criteria for specific pollutants should generally be identified as ARARs for surface water cleanup if circumstances exist at a site that water quality criteria were specifically designed to protect, unless the state has promulgated corresponding water quality standards that apply to the water bodies at the site (see "ARARs Q's and A's: Compliance with Federal Water Quality Criteria," USEPA Pub. No. 9234.2-09/FS, June 1990). ARARs and TBCs for surface water include the following:

- CTR and National Toxics Rule (NTR) Criteria

- Water Quality Control Plan (also known as the Basin Plan) for the Sacramento and San Joaquin River Basins

- Safe Drinking Water Act and California Safe Drinking Water Act

See Table 16 for a summary of the chemical-specific potential ARARs for surface water quality.

are established for a specific chemical that may be present in a specific media at the site, or that may be discharged to the site during remedial activities. These ARARs set limits on concentrations of specific hazardous substances, pollutants, and contaminants in the environment. Examples of this type of ARAR include state and federal drinking water standards.

- **Location-specific** ARARs set restrictions on certain types of activities based on site characteristics. Federal and state location-specific ARARs are restrictions placed on the concentration of a contaminant or the activities to be conducted because they are in a specific location. Examples of special locations possibly requiring ARARs may include flood plains, wetlands, historic places, and sensitive ecosystems or habitats.

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USEPA has evaluated and identified the ARARs for the selected remedy in accordance with CERCLA, the NCP, and USEPA guidance, including the CERCLA Compliance with Other Laws Manual, Part I (Interim Final), OSWER Directive 9234.1-01 (USEPA, 1988a) and CERCLA Compliance with Other Laws Manual, Part II, OSWER Directive 9234.1-02 (USEPA, 1989). Tables 16 (chemical-specific), 17 (location-specific), and 18 (action-specific) present the ARARs for the selected remedy.

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- CTR and National Toxics Rule (NTR) Criteria

- Water Quality Control Plan (also known as the Basin Plan) for the Sacramento and San Joaquin River Basins

- Safe Drinking Water Act and California Safe Drinking Water Act

See Table 16 for a summary of the chemical-specific ARARs for surface water quality. These chemical specific levels are ARARs for surface water quality at the Site. The CTR and Basin Plan values are independantly applicable with respect to treatment system discharges that will travel offsite.

TABLE 16
Chemical-Specific Potential ARARs for Surface Water Quality
Lava Cap Mine Site – Mine Area OU ROD

Chemical	CTR Criteria Freshwater Aquatic Life Protection		CTR Criteria Human Health Protection (10^{-6} risk for carcinogens) for Consumption of:		Background	Maximum Contaminant Level (MCL) [a]		Most Stringent Standard [b]
	Criterion Maximum Concentration	Criterion Continuous Concentration	Water + Organisms	Organisms Only		Primary MCL	Secondary MCL	
Aluminum	NA	NA	NA	NA	160	1,000	200	200
Arsenic	340 [b]	150 [b]	NA	NA	1.8	10	NA	10
Cyanide	22 [c]	5.2 [c]	700	220,000	1.5	150	NA	5.2 [c]
Iron	NA	NA	NA	NA	50 / 2,540 [d]	NA	300	300 / 2,540 [d]
Manganese	NA	NA	NA	NA	4.4 / 240 [d]	NA	50	50 / 240 [d]
Mercury	NA	NA	0.050	0.051	0.004	2	NA	0.05
pH	NA	NA	NA	NA	NA	NA	6.5 to 8.5	6.5 to 8.5
Sulfate	NA	NA	NA	NA	3,540	500,000 [e]	250,000 [f]	250,000 [f]
TDS	NA	NA	NA	NA	59,000	NA	500,000 [g]	500,000 [g]

Notes:
All units are in µg/L.
NA = Not applicable or not available.
[a] The most stringent of the state and federal MCLs is listed.
[b] All criteria, except where noted, are expressed in terms of total concentrations.
[c] Promulgated for specific California waters in the National Toxics Rule.
[d] First value is expressed as dissolved; second value is total.
[e] Proposed.
[f] Recommended level; upper level = 500,000 µg/L; short-term level = 600,000 µg/L.
[g] Recommended level; upper level = 1,000,000 µg/L; short-term level = 1,500,000 µg/L.

TABLE 17
Chemical-specific ARARs
Lava Cap Mine Site – Mine Area OU ROD

Standard, Requirement, Criterion, or Limitation	ARAR Status	Description	Comment
National Drinking Water Standards maximum contaminant levels (MCLs) 40 CFR 300.430(e)(2)(I)(B) Safe Drinking Water Act	Relevant and appropriate	Establishes national primary drinking water standards, MCLs, to protect the quality of water in public water systems. MCLs represent the maximum concentrations of contaminants permissible in a water system delivered to the public. MCLs are generally relevant and appropriate when determining acceptable exposure limits for current or potential sources of drinking water.	National primary drinking water standards are health-based standards for public water systems (MCLs). The NCP defines MCLs as relevant and appropriate for water determined to be a current or a potential source of drinking water in cases where maximum contaminant level goals (MCLGs) are not ARARs.
California Safe Drinking Water Standards (MCLs) State MCLs found in 22 CCR §64435 and §64444.5	Relevant and Appropriate	Establishes primary MCLs for contaminants that cannot be exceeded in public water systems. In some cases the California drinking water standards are more stringent than the federal MCLs.	Like federal MCLs, state MCLs are applicable as cleanup goals for waters determined to be a current or a potential source of drinking water. State MCLs are referenced in the Basin Plan as the minimum standards for waters with a beneficial use of municipal or domestic supply.
National Toxics Rule (NTR) and California Toxics Rule (CTR) 40 CFR Part 131	Applicable and Independantly Applicable	Establishes numeric aquatic life criteria and human health criteria for priority toxic pollutants. This regulation is applicable to inland surface waters, bays, and estuaries in California.	This standard establishes criteria for surface water quality. Thus, it is applicable to surface waters at Lava Cap Mine.
State Water Resources Control Board (SWRCB) Resolution 68-16	Applicable	This resolution requires the continued maintenance of high-quality water of the state. Water quality may not be degraded below what is necessary to protect the "beneficial uses" of the water source.	Remedial actions at Lava Cap Mine that involve discharges to surface water or surface water drainage courses must take into account the protection of beneficial uses and the maintenance of high-quality waters in the area.
RWQCB's Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan)	Applicable and Independantly Applicable	Sacramento and San Joaquin River Basins Basin Plan, dated December 9, 1994, establishes beneficial uses for groundwater and surface water, water quality objectives designed to protect those beneficial uses, and implementation plans to achieve water quality objectives.	The narrative water quality objectives described in the Basin Plan are considered ARARs. Numeric values based on nonpromulgated guidance documents and developed on a site-by-site basis are not considered ARARs, but may be recognized as TBCs.

TABLE 18
Location-Specific ARARs
Lava Cap Mine Site – Mine Area OU ROD

Citation	Summary of Requirement	Evaluation
National Historic Preservation Act (16 U.S.C. 470 et seq.; 36 CFR Part 800; 40 CFR 6.301(b); Executive Order 11593); National Historic Landmarks Program (36 CFR Part 65); National Register of Historic Places (36 CFR Part 60)	Federal agencies must identify possible effects of proposed remedial activities on historic properties (cultural resources). If historic properties or landmarks eligible for, or included in, the National Register of Historic Places exist within remediation areas, remediation activities must be designed to minimize the effect on such properties or landmarks.	Applicable.
Archaeological and Historical Preservation Act (16 U.S.C. 469 et seq., 40 CFR 6.301(c))	Establishes procedures to provide for preservation of historical and archeological data that might be destroyed through alteration of terrain as a result of federal construction project or a federally licensed activity or program. Presence or absence of such data on the site must be verified. If historical or archaeological artifacts are present in remediation areas, the remedial actions must be designed to minimize adverse effects on the artifacts.	Applicable.
Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa-ii; 43 CFR7)	Steps must be taken to protect archaeological resources and sites that are on public and Indian lands and to preserve data. Investigators of archaeological sites must fulfill professional requirements. The potential presence of archaeological sites has not yet been determined.	Applicable.
Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq. And 40 CFR 6.302(g))	Requires consultation with USFWS (and State of California Department of Fish and Game (CDFG)) when any federal department or agency proposes or authorizes any modification of stream or other water body greater than 10 hectares; requires adequate provisions for protection of fish and wildlife resources). Certain remedies may result in the temporary or permanent modification of naturally occurring water bodies and may require the construction of mitigated wetlands in other areas.	Applicable.
Fish and Game Code Section 1600 and 1603	Requirements for construction by, or on behalf of any State or local agency or public utility that will change the natural flow or use material from the beds or result in disposal into designated waters.	Relevant and Appropriate.
Clean Water Act (Section 404) - Dredge or Fill Requirements (33 U.S.C. 1251-1376; 40 CFR 230)	Establishes requirements that limit the discharge of dredged or fill material into waters of the United States. EPA guidelines for discharge of dredged or fill materials in 40 CFR 230 specify consideration of alternatives that have fewer adverse impacts and prohibit discharges that would result in exceedence of surface water quality standards, exceedence of toxic effluent standards, and jeopardy of threatened or endangered species. Special consideration required for "special aquatic sites" defined to include wetlands.	Applicable.
Protection of Floodplains (Executive Order 11988; 40 CFR 6.302(b); 40 CFR Part 6, Appendix A)	Requires federal agencies to evaluate the potential effects of action they may take in a floodplain to avoid the adverse impacts associated with direct and indirect development of a floodplain.	Applicable for activities that may occur within the 100-year floodplain.

Citation	Summary of Requirement	Evaluation
Protection of Wetlands (Executive Order 11990; 40 CFR 6.302(a); 40 CFR Part 6, Appendix A)	Requires federal agencies to take action to avoid adversely affecting wetlands, to minimize wetlands destruction, and to preserve the value of wetlands.	Applicable if wetlands are identified.
42 U.S.C.Section 9621(d) 40 C.F.R. Section 300.440	CERCLA Section 121(d)(3) and EPA regulations establish independantly applicable requirements regarding offsite disposal of hazardous substances from a Superfund site.	Independantly applicable.

Notes:

TABLE 19

Action-Specific ARARs

Lava Cap Mine Site – Mine Area OU ROD

Citation	Summary of Requirement	Evaluation
Land Use Covenants Regulations (22 CCR, Division 4.5, Chapter 39, Section 67391.1)	Regulations specify that a land use covenant (LUC) imposing appropriate limitations on land use shall be executed and recorded when hazardous materials, hazardous wastes or constituents, or hazardous substances will remain at the property at levels that are not suitable for unrestricted use of the land. Land use restrictions and covenants are to run with the land and be recorded in the county where the property is located.	Substantive provisions are relevant and appropriate.
Northern Sierra Air Quality Management District (AQMD) Rules 205 (nuisance) and 225 (dust control).	Rule 205: prohibits discharges of air contaminants that cause a nuisance. Rule 225: Remedial activities will be designed to take all reasonable precautions to prevent particulate matter from becoming airborne including, but not limited to, as appropriate, the use of water or chemicals as dust suppressants, the covering of trucks, and the prompt removal and handling of excavated materials.	Applicable.
National Pollutant Discharge Elimination System (40 CFR Part 122)	The National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States.	Independantly applicable to discharges from the treatment system to Little Clipper Creek.
40 CFR Parts 122, 123, 124, NPDES Permit Program as implemented by the California Stormwater Permit Program for Construction Activities (SWRCB Order # 97-03-DWQ)	Regulates pollutants in the discharge of stormwater associated with construction activities, including treatment of waste.	Applicable to stormwater discharges to Little Clipper Creek.
California Health and Safety Code Section 25355.5	Establishes requirements for covenants to restrict use of property where hazardous substances are present.	Relevant and appropriate.
California Civil Code Section 1471(c)	Establishes requirements for deed restrictions such as environmental restrictions and land use covenants. Sepcifies requirements for land use covenants to run with the land by applying to successors in title to the land.	Applicable.
Mining closure requirements under Water Code §13172	Group A and B waste piles – close in accordance with 27 CCR §21090 (a), (b), and (c). Group A and B surface impoundments – close in accordance with 23 CCR 21400(a) and (b)(1); some surface impoundments with clay liners may be closed in place.	Relevant and appropriate.

Notes:

Water Quality Control Plan for the Sacramento and San Joaquin River Basins

The State of California, as authorized by USEPA, established water quality objectives for the protection of groundwater and surface water under the Porter-Cologne Water Quality Control Act. These water quality objectives are established by the California RWQCBs for each basin and are based on the beneficial use(s) of the waters. The Water Quality Control Plan (also known as the Basin Plan) for the Sacramento and San Joaquin River Basins, dated December 9, 1994 (amended twice and reissued in 1998), establishes beneficial uses for groundwater and surface water as well as water quality objectives (the "criteria" under the CWA) designed to protect those beneficial uses. The Basin Plan describes implementation plans and other control measures designed to ensure compliance with statewide plans and policies and provides comprehensive water quality planning.

Little Clipper Creek, and discharges thereto, are surface waters located within the project area that have been effected by mine tailings and adit discharges and will be addressed by the remedy selected in this ROD. Little Clipper Creek is an undesignated water body within the Sacramento and San Joaquin River Basin. Little Clipper Creek is a tributary to Little Greenhorn and Greenhorn Creeks, which are tributaries to the Bear River. The Bear River is specifically identified in the Basin Plan, and its beneficial uses include:

- Municipal and domestic supply (MUN)
- Agricultural supply (AGR)
- Industrial service supply (IND)
- Contact and non-contact water recreation (REC-1 and REC-2)
- Warm and cold freshwater habitat (WARM and COLD)
- Wildlife habitat (WILD)

Parameter	Criteria for Warm and Cold Freshwater Habitat
pH	6.5 to 8.5 pH unit (Changes in normal ambient pH levels shall not exceed 0.5)
Dissolved Oxygen	> 5 milligrams per liter (mg/L)
Sediment	The suspended sediment load and discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.
Turbidity	Increases in turbidity attributable to controllable water quality factors shall not exceed the following limits: Where natural turbidity is between 0 and 5 nephelometric turbidity units (NTUs), increases shall not exceed 1 NTU; where natural turbidity is between 5 and 50 NTUs, increases shall not exceed 20 percent; Where natural turbidity is between 50 and 100 NTUs, increases shall not exceed 10 NTU; where natural turbidity is greater than 100 NTUs, increases shall not exceed 10 percent.

Table 20: California Physical Parameters Criteria in Surface Water

Under the Basin Plan, water bodies within the basins that do not have designated beneficial uses are assigned MUN designations at a minimum (i.e., municipal and domestic water supply) in accordance with the provisions of SWRCB Resolution No. 88-63 (unless the exemptions in Resolution 88-63 apply).

Based on the characteristics and location of Little Clipper Creek, additional beneficial uses likely apply, which include the designated beneficial uses of the Bear River noted above.

The Basin Plan also contains water quality objectives for physical parameters. Table 20 presents the relevant criteria for physical parameters that have been identified for surface waters in the Lava Cap Mine area.

Safe Drinking Water Act

The Safe Drinking Water Act establishes national primary drinking water standards, MCLs, to protect the quality of water in public water systems. MCLs are enforceable standards and represent the maximum concentrations of contaminants permissible in a water system delivered to the public. MCLs are generally relevant and appropriate when determining acceptable exposure limits for waters that are a current or potential source of drinking water [(40 CFR 300.430(e)(2)(i)(B)]. For the Lava Cap Mine Site, MCLs are relevant and appropriate as cleanup criteria for surface water bodies because, according to the Basin Plan, these water bodies are potential sources of drinking water. In the case of inorganic compounds, the natural background concentrations have also been considered when developing cleanup goals (e.g., in cases where the background concentrations are greater than MCLs).

13.2 Location-Specific ARARs

Location-specific ARARs are those requirements that relate to the geographical position or physical condition of the site. These requirements may limit the type of remedial action that can be implemented or may impose additional constraints on some remedial alternatives. The major location-specific ARARs that could affect implementation of the remedy are categorized and briefly described below. Location-specific ARARs for the Mine Area OU remedy are summarized in Table17.

National Historic Preservation Act, National Historic Landmarks Program, and National Register of Historic Places

The NHPA, 16 U.S.C. §470, requires federal agencies to take into account the effect of any federally assisted undertaking or licensing on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places (NRHP). Criteria for evaluation are included in 36 CFR Part 60.4. The Lava Cap Mine site has not been designated as having historic value to warrant inclusion in the NRHP. If an eligible structure were encountered, the procedures for protection of historic properties set forth in Executive Order 11,593 entitled "Protection and Enhancement of the Cultural Environment" and in 36 CFR Part 800, 36 CFR Part 63, and 40 CFR Part 6.301(c) would be applicable.

Archaeological and Historic Preservation Act and Archaeological Resources Protection Act

The Archaeological and Historic Preservation Act, 16 U.S.C. §469, and the Archaeological Resources Protection Act, 16 U.S.C. §470, established procedures to preserve and protect archaeological resources. The first provides for preservation of historical and archaeological data that might be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program. The second prescribes steps taken by investigators to preserve data. If remedial activities would cause irreperable loss or destruction of significant scientific, prehistoric, historical, or archaeological

data, mandatory data recovery and preservation activities would be necessary. The implementing regulations [40 CFR 6.301(c) and 43 CFR 7] will be applicable if eligible structures are identified.

Endangered Species Act

The Endangered Species Act (ESA), 16 U.S.C. §1531, et seq., requires consultation with the resource agencies for remedial actions that may affect these species. Section 7 of the ESA requires that federal agencies consider whether their actions will jeopardize the existence of species that are listed as threatened or endangered by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. However, no endangered or threatened species are known to be present at the Mine Area Operable Unit. And none of the property in this Operable Unit has been designated as critical habitat for any endangered or threatened species.

Fish and Wildlife Conservation Act and Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act, 16 U.S.C. §§661-666, requires federal agencies involved in the control or structural modification of any natural stream or body of water to take action to protect fish and wildlife resources that may be affected by the selected remedial action. The Fish and Wildlife Coordination Act and its implementing regulations (40 CFR 6.302(g)) are applicable to Site remediation activities.

Clean Water Act (Section 404)

Section 404 of the CWA, 33 U.S.C. §1344, requires a permit and the meeting of substantive requirements for the discharge of dredged or fill material into waters of the United States. CC, Little Clipper Creek, and Lost Lake are considered "waters of the United States."

Activities associated with the selected remedy that might trigger Section 404 requirements include road construction, sediment removal, and surface-water diversions. As these activities are onsite actions, the substantive provisions of Section 404 and its implementing regulations are applicable ARARs for such activities. The *Guidelines for Specification of Disposal Sites for Dredged or Fill Material* [40 CFR Part 230, Section 404(b)(1)] define requirements that limit the discharge of dredged or fill material into the aquatic environment or aquatic ecosystems. These guidelines specify consideration of alternatives that have fewer adverse impacts and prohibit discharges that would result in exceedance of surface-water quality standards, exceedance of toxic effluent standards, and jeopardize threatened or endangered species. Actions that can be taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem are specified in Subpart H of 40 CFR 230, and include:

- Confining the discharge's effects on aquatic biota
- Avoiding disruptions of periodic water inundation patterns
- Selection of disposal site and method of discharge
- Minimizing or preventing standing pools of water

Executive Order on Floodplain Management

The Executive Order on Floodplain Management, Executive Order No. 11,988, requires that federal agencies evaluate the potential effects of actions that may take place in a floodplain to avoid, to the extent possible, adverse effects associated with direct and indirect development of a floodplain. USEPA's regulations to implement this Executive Order are set forth in 40 C.F.R. §6.302(b). In addition, USEPA has developed guidance entitled "*Policy on Floodplains and Wetlands Assessments for CERCLA Actions*," dated August 6, 1985. The requirements of this regulation are applicable if implementation of the remedy affects the floodplain at the site.

Executive Order on Protection of Wetlands

The Executive Order on Protection of Wetlands, Executive Order No. 11,990, requires that federal agencies avoid, to the extent possible, adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists. USEPA's regulations to implement this Executive Order are set forth in 40 C.F.R. §6.302(a). In addition, USEPA has developed guidance entitled "*Policy on Floodplains and Wetlands Assessments for CERCLA Actions*". If wetlands are encountered at the Lava Cap Mine site, these requirements would be applicable.

13.3 Action-Specific ARARs

ARARs are technology- or activity-based requirements that are triggered by the type of remedial activities selected. These ARARs generally set performance, design, or other similar action-specific controls or restrictions on particular kinds of activities. Table 18 lists the action-specific ARARs for the selected remedy.

Exemption of Mining Waste from Hazardous Waste Regulations

All of the waste streams generated at the Lava Cap Mine Site relate to the historic mining operations at the site. As such, these waste streams are exempted under RCRA §3001(b)(3)(A)(ii), 42 U.S.C. §6921(a)(3)(A)(ii) (also known as the "Bevill Amendment"). The Bevill exclusion, codified in 40 C.F.R. §261.4(b)(7), provides that "[s]olid waste from the extraction, beneficiation and processing of ores and minerals (including coal), including phosphate rock and overburden from the mining of uranium ore [are not hazardous wastes]." In addition, any residues (i.e., sludge) generated from treatment of adit discharge or seeps are also exempted because the residue is the direct result of "extraction" included under the Bevill Amendment. The handling and disposal of mine tailings, treatment residues, or other wastes that are result of mineral extraction or beneficiation at the site are not subject to RCRA Subtitle C regulations or hazardous wastes regulations under the California Hazardous Waste Control Law. The California equivalent to the Bevill exclusion can be referenced in Section 66261.4(b)(5) of Title 22.

CERCLA Offsite Rule

CERCLA Section 121(d)(3) and USEPA regulations establish independently applicable requirements regarding offsite disposal of hazardous substances. This rule and these regulations would apply to soil, sediment, standing water, debris, and any other contaminated material targeted for excavation from the mine buildings and immediately adjacent areas, and planned to be shipped offsite, as described under Selected Alternative 2-3.

Regional Board Regulation of Mining Waste

Water Code §13172 and the regulations promulgated thereunder [27 CCR 22480(b)] establish three groups of mining wastes as follows:

- Group A – Mining wastes that must be managed as hazardous waste pursuant to Title 22, provided the RWQCB finds that such mining wastes pose a significant threat to water quality.
- Group B – Mining wastes that consist of or contain hazardous wastes, that qualify for a variance under Title 22, provided that the RWQCB finds that such mining wastes pose a low risk to water quality; and mining wastes that consist of or contain nonhazardous soluble pollutants of concentrations which exceed water quality objectives for, or could cause, degradation of waters of the State.
- Group C - Mining wastes from which any discharge would be in compliance with the applicable water quality control, including water quality objectives, other than turbidity.

The selected remedy includes construction of a buttress and capping the existing tailings impoundment. The mining wastes generated at the site would need to be classified to determine the design parameters for the existing onsite mining waste management unit. The wastes at Lava Cap Mine most likely would not be classified as Group A wastes, but may be considered Group B wastes. STLC and TCLP analyses on tailings samples conducted during the RI/FS indicate that mining wastes contain nonhazardous levels of soluble pollutants. Although mining wastes would likely be considered Group B wastes, the conceptual design criteria for onsite disposal will assume requirements for Group A wastes as relevant and appropriate ARARs. Group A design criteria are selected to address community concerns and site-specific conditions.

Closure of Mining Units

Closure requirements for new mining waste units under the Water Code §13172 are as follows:

- Group A and B wastes piles – close in accordance with 27 CCR §21090 (a), (b), and (c).
- Group A and B surface impoundments – close in accordance with 23 CCR 21400(a) and (b)(1); some surface impoundments with clay liners may be closed in place.

The closure requirementss are relevant and appropriate ARARs.

National Pollutant Discharge Elimination System Permit Program and Waste Discharge Requirements

New discharges of treated water to Little Clipper Creek must comply with the requirements of the NPDES permit program. This permit program is generally administered by the RWQCB through the issuance of Waste Discharge Requirements (WDRs). Because the discharge of treated water to Little Clipper Creek will result in an offsite discharge, the requirements are not ARARs but are regulations of independent legal applicability for this portion of the Selected Remedy.

Air Quality Requirements

Implementation of the selected Mine Area OU remedy will require control of particulates. Under the Clean Air Act, the USEPA has set forth National Ambient Air Quality Standards that define levels of air quality necessary to protect public health (40 CFR Part 50). Lava Cap Mine is located within the Northern Sierra Air Quality Management District. The District is required by state law to achieve and maintain the federal and state Ambient Air Quality Standards. Applicable air regulations to the selected remedy include: Rule 205 which prohibits discharges of air contaminants that cause a nuisance and Rule 225 which requires reasonable precautions to prevent dust emissions.

Land Use Covenants

California requirements pertaining to land use covenants are included as California Code of Regulations, 22 CCR, Division 4.5, Chapter 3.9, Section 67391.1, and California Health and Safety Code Section 25355.5, and California Civil Code Section 1471(c). The substantive portions of state law and these regulations are ARARs with regard to deed restrictions.

13.4 ARARs Waivers

This remedial action shall comply with all ARARs described in this section.

14 Statutory Determinations

Under CERCLA Section 121, USEPA must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), consider the reasonableness of cost for the Selected Remedy, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ, as a principal element, treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes. The following sections discuss how the selected remedy meets these statutory requirements.

14.1 Protection of Human Health and the Environment

The selected remedy will protect human health and the environment by:

- returning currently contaminated residential areas on parcels 39-160-21, 31-160-16, and 39-160-30 to full residential use;
- returning currently contaminated recreational areas on parcels 39-170-66 and 39-170-77 along Little Clipper Creek above Greenhorn Road to full recreational use;
- managing the arsenic-contaminated tailings so as to isolate them from contact with human and ecological receptors using consolidation and a cap;
- preventing any further release of tailings to downstream areas with the cap, construction of the rock buttress, and channelization and management of surface water; and
- collecting and treating contaminated mine discharge and seeps to reduce their toxicity such that they are considered safe for human consumption.

The remedy will also greatly reduce further infiltration into the tailings pile such that the tailings will eventually no longer represent a significant threat to the underlying groundwater. Available treatment technologies are technically feasible and proven effective in meeting cleanup goals for arsenic in the treated surface water. Although care will need to be taken to minimize dust emissions during excavation and consolidation of the tailings, implementation of the remedy will not pose unacceptable short-term risks to local receptors. In addition, no adverse cross-media impacts are expected.

14.2 Compliance with ARARs

The selected remedy complies with federal and state ARARs. See Tables 16, 17, and 18 for a listing of ARARs for the Mine Area OU at the Lava Cap Mine Site.

14.3 Cost-Effectiveness

The fifty year net present worth cost of the selected remedy is estimated at $14.1 million. USEPA believes the selected remedy has a high degree of overall effectiveness in comparison to cost and

represents a reasonable value for the money to be spent. Section 300.430(f)(ii)(D) of the NCP requires USEPA to evaluate the cost of an alternative relative to its overall effectiveness.

14.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

USEPA has determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Mine Area OU of the Lava Cap Mine Superfund Site. USEPA has also determined that the selected remedy provides the best balance of tradeoffs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and bias against off-site treatment and disposal and considering State and community acceptance.

The selected remedy provides containment of the contaminated tailings that will achieve significant reductions in potential current and future exposure to the tailings (a principal threat waste). The contaminated mine drainage and seeps will be treated, providing significant reductions in arsenic levels such that the water would be deemed safe for human consumption. In addition, the selected remedy also satisfies the long-term effectiveness criterion by substantially reducing the long-term threat to groundwater represented by the tailings pile (through capping and surface-water channelization and management). The selected remedy does not present any short-term risks that can not be mitigated with careful implementation of dust control measures during construction. There are no special implementability issues that sets the selected remedy apart from any of the other alternatives evaluated.

The selected remedy will be implemented in phases, with design and construction of the surface water treatment system delayed until after the other components of the remedy have been implemented. Specifically, all of the surface water management and the tailings containment (capping and buttress) components will be implemented first. This will allow USEPA to gather data to assess the ultimate flow rate of water requiring treatment. Depending on the flow rate of water and the arsenic levels in the water, USEPA will evaluate innovative arsenic removal treatment technologies. And, if one is found to be reliable and cost-effective, an innovative treatment technology will be installed at the surface water treatment plant. If this occurs, the selected remedy would satisfy USEPA's goal of using alternative technologies to the maximum extent practicable.

14.5 Preference for Treatment as a Principal Element

By treating the arsenic-contaminated mine drainage and seeps using either ferric chloride coagulation/ filtration or another equally effective technology, the selected remedy addresses a major, continuing component of the Site contamination through use of treatment technologies. By using treatment as a significant component of the remedial action, the statutory preference for remedies that employ treatment as a principal element is supported. As part of the FS, USEPA determined that it was not going to be practicable to attempt removal of the arsenic contamination from the large volume of tailings using treatment. Thus, the remedial alternatives, including the selected remedy, all considered management and containment of the tailings rather than treatment.

14.6 Five-Year Reviews

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining onsite above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment. If it is determined that the remedy is not or will not be protective of human health and the environment, then modifications to the remedy will be evaluated and implemented as necessary.

15 Documentation of Significant Changes

The Proposed Plan for the Lava Cap Mine Site Mine Area OU was released for public comment in February 2004. The Proposed Plan identified Alternative 1-4 (Excavation around Residences) for the Mine Area residences; Alternative 2-3 (Capping and Buttress Construction) for the Mine Buildings, Tailings, Waste Rock, and Mine Drainage component; and Alternative 3-4 (Excavation) for Little Clipper Creek. USEPA has not received any comments on its proposal that warrant significantly changing the remedy identified in the Proposed Plan. proposal. See the Responsiveness Summary (Part III of this ROD) for discussion of the issues raised by the public, state agencies and other stakeholders.

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